PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

To:
Marks & Clerk
Attn. PEARCE, A.
Alpha Tower
Suffolk Street Queensway
Birmingham B1 1TT
UNITED KINGDOM

MAY 1999

Date of mailing *(day/month/year)* 25/05/1999	
Applicant's or agent's file reference Q036760PPC	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/GB 99/00158	International filing date *(day/month/year)* 18/01/1999
Applicant CADBURY SCHWEPPES PLC et al.	

1. [X] The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Cristina Iacoponi

Form PCT/ISA/220 (July 1998)

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international pbulication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international appplication is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
Q036760PPC		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/GB 99/00158	18/01/1999	21/01/1998
Applicant		
CADBURY SCHWEPPES PLC et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

[X] the text is approved as submitted by the applicant.

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 1

[X] as suggested by the applicant.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

[ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 99/00158

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A23G3/22 B05C5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A23G B05C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 128 667 A (TIMSON WILLIAM J) 5 December 1978 see the whole document ---	1,3-7, 9-11, 13-15,17
X	US 4 419 953 A (FOWLER DAVID P) 13 December 1983 see abstract see column 1, line 37 - column 2, line 37 see column 3, line 55 - column 4, line 18 see figures 1,3 ---	1-11, 13-17
X	EP 0 551 237 A (EASTMAN KODAK CO) 14 July 1993 see figures 1,7 see claims --- -/--	1,10,13, 17

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
4 May 1999	25/05/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Boddaert, P

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Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 99/00158

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 559 701 A (CIBA GEIGY AG) 23 January 1980 see the whole document	1,3,5-8, 10,11, 13,17
P,A	GB 2 326 116 A (CADBURY SCHWEPPES PLC ;S & C THERMOFLUIDS LTD (GB)) 16 December 1998 see the whole document	1-17
A	US 5 004 620 A (STRAIGHT JAY G ET AL) 2 April 1991	
A	EP 0 444 767 A (ROLLS ROYCE PLC) 4 September 1991	
A	US 5 409 733 A (BENECKE JURGEN ET AL) 25 April 1995	

1

INTERNATIONAL SEARCH REPORT

[redacted]nation on patent family members

[redacted]ternational Application No
PCT/GB 99/00158

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4128667 A	05-12-1978	NONE	
US 4419953 A	13-12-1983	NONE	
EP 0551237 A	14-07-1993	US 5206057 A JP 5253525 A	27-04-1993 05-10-1993
GB 1559701 A	23-01-1980	BE 855011 A CH 621269 A DE 2723444 A FR 2361164 A JP 1297632 C JP 53004053 A JP 60015390 B	25-11-1977 30-01-1981 15-12-1977 10-03-1978 20-01-1986 14-01-1978 19-04-1985
GB 2326116 A	16-12-1998	NONE	
US 5004620 A	02-04-1991	NONE	
EP 0444767 A	04-09-1991	JP 4219161 A	10-08-1992
US 5409733 A	25-04-1995	US 5720820 A US 5733597 A CA 2098784 A DE 69300548 D DE 69300548 T EP 0578469 A JP 6154691 A	24-02-1998 31-03-1998 09-01-1994 02-11-1995 21-03-1996 12-01-1994 03-06-1994

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

PEARCE, A.
Marks & Clerk
Alpha Tower
Suffolk Street Queensway
Birmingham B1 1TT
GRANDE BRETAGNE

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	10.05.2000
Applicant's or agent's file reference Q036760PPC	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB99/00158	18/01/1999	21/01/1998

Applicant
CADBURY SCHWEPPES PLC et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Authorized officer

Nilles, F

Tel.+49 89 2399-2931

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
Q036760PPC		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB99/00158	18/01/1999	21/01/1998
International Patent Classification (IPC) or national classification and IPC		
A23G3/22		
Applicant		
CADBURY SCHWEPPES PLC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☒ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
06/07/1999	10.05.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Clayton, H Telephone No. +49 89 2399 2383

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/00158

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-14 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/1 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1, (2-12), 13, 14, (15, 16), 17
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1, (2-12), 13, 14, (15, 16), 17
Industrial applicability (IA)	Yes:	Claims	1, (2-12), 13, 14, (15, 16), 17
	No:	Claims	

2. Citations and explanations

see separate sheet

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Section V

1. The following documents are referred to:

D1	US-A-5 004 620
D2	GB-A-1 559 701
D3	US-A-4 128 667
D4	EP-A-0 551 237

2. The independent claims

2.1 Claim 1

The subject matter of claim 1 does not satisfy Article 33(2) PCT because D1-D4 all disclose a method according to claim 1:

In D1 (see figures 4 and 8 and column 5, line 44 to column 6, line 16), a chocolate coating is applied to confections moved by means of conveyor 22, and the stream of air from air manifold 86 creates an overpressure which acts on the curtain(s), modifying the flow characteristics (see column 6, lines 11-16).

In D2 (see figures and column 4, lines 92-113), a coating such as a gelatin coating is applied to a moving web of film material, the curtain of solidifiable liquid material being subjected to the action of at least one stream of gas (e.g. from duct 32) under pressure to modify the flow characteristics of the curtain.

A similar arrangement suitable for a similar purpose is shown in D3 (see figures).

In D4 (see especially figures 1 and 3-7, and claims 1, 2, 3, 8, 11 and 12), a photographic composition such as gelatin is applied to a moving web and the curtain is subjected to the action of air being blown into a chamber such that a pressure differential is created across the curtain to modify the flow characteristics of the curtain.

2.2 Claims 13, 14 and 17

For reasons similar to those given above for claim 1, the subject matter of claims 13, 14 and 17 also fails to satisfy Article 33(2) PCT.

3. The dependent claims

The dependent claims cannot be considered allowable as they do not depend

from an allowable independent claim.

It is further noted that D1 discloses both an edible coating and an edible article, and that the other documents disclose an edible coating (gelatin).

Section VI

It has been assumed that the priority of the application is valid but should this prove not to be so the document GB-A-2 326 116 could become relevant in a regional phase.

Section VII

1. The word "relevant" appears in step (ii) of claim 1 where the word "relative" would be expected on the basis of the description and other claims.

2. The application does not satisfy Rule 5.1(a)(ii) PCT as the description does not cite any documents (for example, the most relevant of D1-D4) reflecting the prior art.

VU

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

17

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
Q036760PPC		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB99/00158	18/01/1999	21/01/1998
International Patent Classification (IPC) or national classification and IPC		
A23G3/22		
Applicant		
CADBURY SCHWEPPES PLC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☒ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
06/07/1999	10.05.2000
Name and mailing address of the international preliminary examining authority:	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Clayton, H Telephone No. +49 89 2399 2383

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/00158

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-14 as originally filed

Claims, No.:

1-17 as originally filed

Drawings, sheets:

1/1 as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	
	No:	Claims	1, (2-12), 13, 14, (15, 16), 17
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1, (2-12), 13, 14, (15, 16), 17
Industrial applicability (IA)	Yes:	Claims	1, (2-12), 13, 14, (15, 16), 17
	No:	Claims	

2. Citations and explanations

see separate sheet

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Section V

1. The following documents are referred to:

D1	US-A-5 004 620
D2	GB-A-1 559 701
D3	US-A-4 128 667
D4	EP-A-0 551 237

2. The independent claims

2.1 Claim 1

The subject matter of claim 1 does not satisfy Article 33(2) PCT because D1-D4 all disclose a method according to claim 1:

In D1 (see figures 4 and 8 and column 5, line 44 to column 6, line 16), a chocolate coating is applied to confections moved by means of conveyor 22, and the stream of air from air manifold 86 creates an overpressure which acts on the curtain(s), modifying the flow characteristics (see column 6, lines 11-16).

In D2 (see figures and column 4, lines 92-113), a coating such as a gelatin coating is applied to a moving web of film material, the curtain of solidifiable liquid material being subjected to the action of at least one stream of gas (e.g. from duct 32) under pressure to modify the flow characteristics of the curtain.

A similar arrangement suitable for a similar purpose is shown in D3 (see figures).

In D4 (see especially figures 1 and 3-7, and claims 1, 2, 3, 8, 11 and 12), a photographic composition such as gelatin is applied to a moving web and the curtain is subjected to the action of air being blown into a chamber such that a pressure differential is created across the curtain to modify the flow characteristics of the curtain.

2.2 Claims 13, 14 and 17

For reasons similar to those given above for claim 1, the subject matter of claims 13, 14 and 17 also fails to satisfy Article 33(2) PCT.

3. The dependent claims

The dependent claims cannot be considered allowable as they do not depend

from an allowable independent claim.

It is further noted that D1 discloses both an edible coating and an edible article, and that the other documents disclose an edible coating (gelatin).

Section VI

It has been assumed that the priority of the application is valid but should this prove not to be so the document GB-A-2 326 116 could become relevant in a regional phase.

Section VII

1. The word "relevant" appears in step (ii) of claim 1 where the word "relative" would be expected on the basis of the description and other claims.

2. The application does not satisfy Rule 5.1(a)(ii) PCT as the description does not cite any documents (for example, the most relevant of D1-D4) reflecting the prior art.

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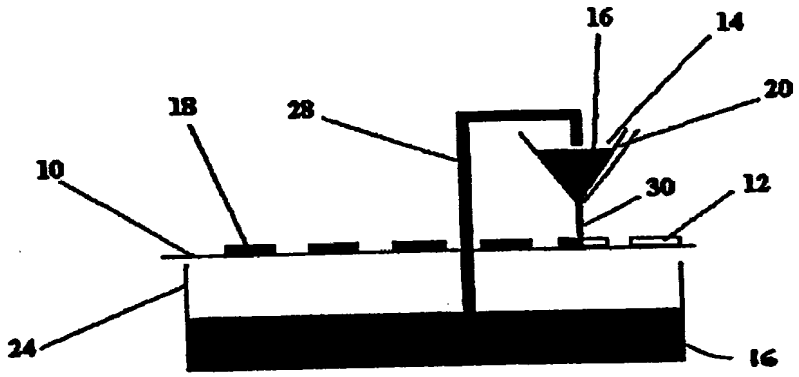

(57) Abstract

A coating such as liquid milk chocolate is applied to articles such as confectionery bars (12). The bars (12) are conveyed by conveyor (10) under a curtain (30) of liquid chocolate issuing through an outlet slot in the trough (14). A layer of air is caused to flow through the outlet slot in the trough (14) so as to modify the flow characteristics of the curtain. The layer of air permits a curtain (30) of even thickness to be achieved.

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METHOD AND APPARATUS OF COATING ARTICLES

This invention relates, in a first of its aspects, to a method of and an apparatus for applying a coating to articles, eg an edible coating to food articles. The invention is particularly, but not exclusively, concerned with the application of edible coating materials which exhibit non-Newtonian behaviour, for example chocolate, to articles of confectionery and the like. The present invention also relates, in a second of its aspects, to an improved method of forming a curtain of material eg edible material which can be used to coat articles eg articles of food or which can be used in other ways in the formation of articles, eg articles of food.

It is well known to enrobe articles of food such as chocolate assortments, confectionery bars, biscuits, cookies and cakes with a layer of chocolate. This coating process is known as chocolate enrobing and is traditionally effected by moving the articles on a mesh-type conveyor belt through a curtain of liquid chocolate whose consistency is carefully controlled. However, it is difficult to achieve the desired coating because of the high viscosity. It is therefore common practice to subject the articles to a greater than needed coating, then controlling the amount of chocolate remaining on the articles by blowing by air from fans and using vibration to remove the excess.

Also, the temperature of chocolate cannot be increased so as to reduce its viscosity as it will lose its temper, causing problems of incorrect fat crystallisation which can deleteriously affect the appearance and/or eating quality of the chocolate. Thus, it is common for enrobing chocolate to have a higher fat content than standard chocolate used for making chocolate bars in order to reduce its viscosity. This has adverse cost

implications.

In order to establish the curtain of chocolate, it is known to allow chocolate to pass under the action of gravity through an outlet slot in the bottom of a trough having inclined side walls leading to the slot. This type of apparatus has a relatively low throughput because of the high viscosity of the chocolate and the relatively low rate at which it can flow through the outlet slot. The common solution to this problem is to use a wider slot, which results in a thicker curtain which then requires removal of more excess from the articles. Because of the physical characteristics of the chocolate which passes through the slot, the curtain can "neck" to a substantial extent. In other words, the width of the chocolate curtain becomes substantially less than the length of the slot from which it issues. This means that the effective cover of the curtain over the width of the conveyor belt used to carry the articles through the curtain is reduced.

Another known form of apparatus for producing a chocolate curtain utilises a roller along which liquid chocolate is distributed and carried to a blade which causes the layer of chocolate on the roller to become detached and thereby establish the curtain. This can provide higher coating rates with a better control of curtain thickness, but difficulties still arise in coating.

With both of the above types of known apparatus, the amount of chocolate in the descending curtain is greatly in excess of that required to coat the articles. The excess drains through the mesh-type conveyor belt and needs to be recycled and its condition carefully controlled.

It is an object of a first aspect of the present invention to obviate or mitigate at least some of the above disadvantages.

In accordance with said first aspect of the present invention, there is provided a method of applying a coating to articles, comprising the steps of:

(i) providing a curtain of solidifiable liquid coating material;

(ii) effecting relevant movement between articles to be coated and the curtain so as to coat the articles with the solidifiable liquid coating material; and

(iii) subjecting the solidifiable liquid coating material to the action of at least one stream of gas under pressure whereby to modify the flow characteristics of the curtain.

Also in accordance with said first aspect of the present invention, there is provided apparatus for applying a coating to articles, comprising:

(i) supply means arranged to provide a curtain of solidifiable liquid coating material;

(ii) means for effecting relative movement between articles to be coated and the supply means whereby in use the articles are coated with the solidifiable liquid coating material in the curtain; and

(iii) means arranged to subject the solidifiable liquid coating material to the action of at least one stream of gas under pressure whereby to modify the flow characteristics of the curtain.

Preferably, the articles are articles of food and the coating material is an edible coating material.

In the case where the present invention is used in a coating apparatus of the type in which the coating material is caused to flow along a surface of the supply means (eg a trough) towards an outlet slot through which the coating material flows under the action of gravity to form the curtain, it is

preferred for said at least one stream of gas to be introduced between the coating material and the surface of the supply means. In this way, a layer of gas can be introduced between the surface and the coating material as it flows towards the outlet slot. Preferably, in the case of a trough where the coating material flows over opposed surfaces towards the outlet slot, a layer of gas is introduced between the coating material and each of the opposed surfaces. This can not only substantially reduce the resistance to flow of the coating material over the surfaces, but can also reduce the viscosity of the coating material if it is of a type whose viscosity is reduced when subjected to shear.

It is particularly preferred to cause said at least one stream of gas under pressure to become attached to the surface of the supply means so as to assist in establishing the layer of the gas between the surface and the coating material. This may be achieved by positioning one or more gas-admission slots in such a way as to direct the gas against the surface of the supply means. The spacing between the outlet slot and the or each gas-admission slot depends upon the nature of the coating material and the geometry of the supply means, which may comprise a trough having V-shaped walls defining opposed surfaces which converge towards the outlet slot. If the or each gas-admission slot is disposed too close to the outlet slot, then the flow of gas through the outlet slot may actually restrict the flow of coating material therethrough. On the other hand, if the or each gas-admission slot is disposed too far away from the outlet slot, the coating material flowing over the surface may become re-attached to the surface of the supply means before it reaches the outlet slot.

In the case where the above-mentioned trough is employed, it is within the scope of the present invention to provide said at least one stream of gas under pressure at one or both convergent opposed surfaces of the

trough leading to the outlet slot.

Said at least one stream of gas under pressure may be applied to the coating material after the curtain has been established in order to change the direction of the curtain and/or a physical property of the coating material forming the curtain. It is also within the scope of the present invention to subject the coating material to the action of at least one stream of gas both before and after the curtain has been established.

A curved surface may be provided adjacent to part of the curtain, and means may be provided for causing a stream of gas to flow over the curved surface by virtue of the Coanda effect and to use this to induce a change in the direction of travel of the curtain. In this way, it is possible to control the direction of flow of the curtain from any angle from vertical to substantially horizontal. This effect can be used whether or not the coating material is subjected to the action of at least one stream of gas under pressure before the curtain is established. In this regard, the curtain may be established by flow of the coating material through an outlet slot or by distributing the coating material over the length of a roller and causing it to be transported to a blade which removes the coating material from the roller and thereby establishes the curtain.

It is within the scope of the present invention to use one or more curtains of coating material to coat the articles and to control the direction of movement of these curtains simultaneously or independently in such a way as to ensure maximum coverage. For example, one of the curtains may be controlled so that its direction of movement is an acute angle (e.g. 45°) relative to the direction of relative movement between the articles and the curtain, whilst the other curtain can be controlled so that its direction of movement is at an obtuse angle (e.g. 135°) with respect to said

direction of relative movement. In this way, coating of upstream and downstream ends of the articles may be facilitated.

In certain embodiments, the control of the pressure of the stream of gas can be employed to control the speed of descent of the curtain. Thus, by controlling the rate of descent of the curtain and the rate of relative movement between the articles and the curtain, a variety of different effects can be achieved. For example, if the rate of descent of the curtain is matched with the rate of relative movement, then a smooth coating can be achieved. If the rate of curtain descent is greater than the rate of relative movement, then a surface patterning effect can be achieved by the resultant folding of the applied curtain onto the articles. On the other hand, if the rate of descent is less than the rate of relative movement, a degree of stretching of the coating material as it becomes attached to the articles may be achievable with resultant thinning of the layer of coating material applied to the articles. The effects achieved will also depend upon the physical properties of the coating material.

The present invention is applicable to the use of non-Newtonian liquids such as chocolate or Newtonian liquids such as caramel as coating materials.

In the case of chocolate (or other non-Newtonian liquid, a liquid whose viscosity reduces when subjected to shear), a very high degree of control is achievable because the stream of gas under pressure can be caused to contact the surface of the chocolate in such a way as to reduce its viscosity by application of a shear force. This has the particular advantage that the chocolate flows much more easily but then rapidly thickens once the shear force has been removed. The application of the stream of gas under pressure to the chocolate before the curtain has been established can

enable the previously mentioned necking problem to be mitigated and can also enable a much higher throughput to be achieved for a given size of coating apparatus. Because of the viscosity reduction achieved, it is possible to coat with a much higher viscosity chocolate than has heretofore been considered possible. For example, it is possible to coat with relatively viscous tempered chocolate, rather than having to coat with a chocolate composition having an increased fat content and subsequently lowered tempered viscosity in order to establish and maintain the desired liquid curtain. The need to effect air blowing and/or vibration on the coated articles may be obviated or mitigated. The present invention permits a curtain of even thickness to be achieved and may also enable a thinner curtain to be produced than has heretofore been possible.

Conveniently, the gas is air. The temperature of the gas may be substantially the same as that of the solidifiable liquid coating material. This is particularly advantageous in the case where the material is liquid chocolate.

It will be appreciated that the present invention in its first aspect involves the control of a curtain of solidifiable liquid coating material for the purpose of coating or enrobing articles. However, it will be appreciated that similar techniques can be employed for controlling a curtain of a solidifiable liquid material for use in the production of other articles. For instance, the curtain can be controlled for the purpose of enabling a layer of the material to be deposited into a mould or moulds (e.g. to produce shells of solidified material which can then be used to contain filling material), or onto a conveyor for solidification as a layer thereon which can be subsequently cut to size or otherwise shaped. The fact that the curtain can be very accurately controlled in terms of the thickness of the curtain and/or its angle/speed of descent means that a close control over

the thickness and/or texture of the deposit can be obtained which can be difficult to achieve with standard confectionery shell technology.

Thus, in its second aspect, the present invention resides in a method of controlling a curtain of a solidifiable liquid composition comprising the steps of:

(i) providing a curtain of solidifiable liquid material; and

(ii) before, during and/or after step (i), subjecting the solidifiable liquid material to the action of at least one stream of gas under pressure whereby to modify the characteristics of the curtain.

Also in accordance with said second aspect of the present invention, there is provided apparatus for controlling curtain of a solidifiable liquid composition comprising:

(i) supply means arranged to provide a curtain of solidifiable liquid coating material; and

(ii) means arranged to subject the solidifiable liquid coating material to the action of at least one stream of gas under pressure whereby to modify the characteristics of the curtain.

The method and apparatus may further include provision for (a) depositing the modified curtain of solidifiable liquid composition to form a layer in a mould or on a surface, and (b) solidifying the deposited composition.

The solidifiable liquid composition is preferably an edible composition.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a schematic view of one embodiment of an apparatus according

to the present invention, where, for ease of demonstration, only one longitudinal trough surface is shown with an air supply,
Fig. 2 is a side view of a trough forming part of the apparatus of Fig. 1, and
Fig. 3 is a schematic view of a second embodiment of apparatus according to the present invention.

Referring now to Fig. 1 of the drawings, the apparatus illustrated therein is for enrobing confectionery bars with a layer of chocolate. The apparatus comprises a mesh-type conveyer belt 10 carrying confectionery bars 12 to be coated horizontally from right to left as viewed in Fig. 1. A liquid chocolate supply trough 14 is spaced above the conveyor 10 and comprises V-shaped walls 14a and 14b leading to a downwardly opening outlet slot 14c. The trough 14 contains liquid chocolate 16 which is to be used for coating the confectionery bars 12 to form coated confectionery bars 18.

The trough 14 contains an additional wall 14d which is inclined at an acute angle relative to the wall 14b and which terminates about 10 mm above the outlet slot 14c which, in this embodiment, has a width of about 2 mm. The walls 14b and 14d together define a downwardly convergent plenum chamber 20 terminating in an air-admission slot 22. The slot 22 has a width of 0.2 mm and extends for the whole length of the outlet slot 14c, and is disposed about 10 mm above the outlet slot 14c of the trough 14. The plenum chamber 20 is connected with a source of pressurized air. Although not shown in the drawings, the wall 14a is likewise provided with an additional wall defining an identical air-admission slot like slot 22.

Disposed below the conveyor 10 is a tank 24 which also contains liquid chocolate 16. A pump (not shown) serves to pump the liquid chocolate

16 from the tank 24 to the trough 14 via pipework 28.

In use, the conveyor belt 10 is operated to move the confectionery bars 12 in a path which carries them under the outlet slot 14c of the trough 14. The chocolate 16 in the trough 14 is typically maintained at a temperature in the range of 28 to 31 °C and travels through the slot 14c under the action of gravity so as to produce a curtain 30 of liquid chocolate through which the confectionery bars 12 pass. The curtain 30 extends perpendicularly across the conveyor belt 10 which carries a plurality of rows of the confectionery bars 12, although only one row of bars 12 is illustrated in the drawings. The resultant coated bars 18 are carried by the conveyor 10 and excess chocolate drips through the holes in the screen conveyor 10 and back into the tank 24 for recirculation.

During this time, air under pressure is supplied to the plenum chamber 20 so that it is ejected through the air-admission slot 22 so as to become attached to that portion of the wall 14b which lies between the slots 22 and 14c. The result of this is that a layer of air is inserted between the chocolate 16 passing towards the outlet slot 14c and the wall 14b immediately upstream of the slot 14c. The same occurs at the wall 14a. This substantially reduces the friction between the chocolate and the walls. Additionally, the pressurised air exerts a shear force on the adjacent surface of the chocolate, thus reducing the viscosity of the chocolate in the region of the outlet slot 14c. This improves the flowability of the chocolate so that it substantially increases the flow rate through the slot and also mitigates the necking problem whereby the width of the curtain 30, i.e. the dimension perpendicular to the plane of the drawing, can be maintained substantially the same as the length of the slot 14c.

In one experiment, it was found that no less than a 70% increase in the

flow rate through the slot 14c could be achieved using an air supply pressure of 2 psig, as compared to the situation where no air is supplied through the gas-admission slot 22. Although, substantially improved results could be achieved with air pressures as low as 0.5 psig and up to about 3 psig. It will be understood that the shear effect is produced because the air is moving at a greater rate than the chocolate with which it is in contact.

The above-described method enables improved control to be achieved, which can lead to the following advantages:-

(a) lighter chocolate coatings,

(b) more precise coating with less excess deposit,

(c) less variation in deposit across the conveyor belt,

(d) faster enrobing speeds,

(e) lower proportion of chocolate to be recycled,

(f) less build-up of chocolate on the edges of the bars, leading to better edge definition,

(g) selective production of textured or plain coatings by adjustment of air pressure and conveyor belt speed.

(h) avoidance of the need to use enrobing chocolate (which has a high fat content to decrease its viscosity when liquid), thereby enabling the use of regular or even lower fat chocolate.

Referring now to Fig. 3 of the drawings, there is illustrated an apparatus also in accordance with the present invention for altering the direction of descent of chocolate curtain 30. The chocolate curtain 30 may be one which has been produced as described hereinabove with reference to Figs. 1 and 2. Alternatively, it may be a conventionally produced chocolate curtain which has been formed without introduction of an air-stream into trough 14. As a further alternative, it may be a conventionally produced

curtain formed by distributing a layer of liquid chocolate onto the surface of a roller and then detaching the layer from the roller by means of a blade.

In the apparatus of Fig. 3, there is provided a cylindrical plenum chamber 40 which is horizontally disposed to one side of the curtain 30 above the conveyer 10 and which extends for greater than the full width of the curtain 30. The plenum chamber 40 may conveniently be mounted on the trough 14 so that it can be positioned close to the outlet 14c. The plenum chamber 40 has a pressurised air inlet 42 and a row of upwardly directed air outlets 44 extending over the length of the plenum chamber 40. An angled cap 46 is secured to the outer periphery of the plenum chamber 40 along a longitudinal side edge thereof which is remote from the curtain 30. The opposite longitudinal side edge of the strip 46 is spaced from the peripheral surface of the plenum chamber 40 so as to define an air-exit slot 48. The slot 48 has a width of typically about 0.2 mm. The plenum chamber 40 can be moved laterally horizontally relative to the curtain 30 so as to enable the gap between it and the curtain 30 to be adjusted. Likewise, the plenum chamber 40 can be turned about its longitudinal axis to enable the position of the slot 48 relative to the curtain 30 to be adjusted.

In use, air is supplied through the inlet 42 into the plenum chamber 40 from whence it issues through the outlets 44 and thence through the outlet slot 48. It is thus caused to adhere to the curved peripheral surface of the plenum chamber 40 by virtue of the Coanda effect whereby it follows the external periphery of the plenum chamber 40 for a considerable distance. The effect of this curved flow of air is to draw the curtain 30 towards the plenum chamber 40, thus altering the angle of descent of the curtain 30. The angle of descent can be varied by varying the pressure of the air

and/or by varying the positioning of the slot 48 relative to the curtain 30.

In Fig. 3, the plenum chamber 40 is shown on the downstream side of the curtain 30 relative to the conveying direction of the confectionery bars 12 through the curtain 30. Thus, the effect is to incline the direction of descent of the curtain 30 at an acute angle relative to the direction of movement of the confectionery bars 12. This can enable improved effects to be achieved. It is possible to "lay" the curtain 30 of chocolate gently onto the surfaces of the bars 12 by appropriately matching the rate of descent of the curtain 30 to the speed and movement of the bars 12. It is also considered that, because of the angling of the curtain 30, it will be possible to improve coating of the leading ends of the confectionery bars 12.

However, it will be appreciated that it is possible to locate the plenum chamber 40 on the opposite side of the curtain 30, ie on the upstream side thereof so as to cause the direction of descent of the curtain 30 to extend at an obtuse angle relative to the conveying direction of the confectionery bars 12. In this way, it is considered that an improved coating of the trailing ends of the confectionery bars 12 may be achievable. Also, further control over the effects produced can be achieved by altering the conveyor rate relative to the rate of descent of the curtain 30.

If desired, the confectionery bars 12 may be taken through more than one curtain 30 with the curtains being disposed of the same or different angles depending upon the effects required.

If desired, the confectionery bars may be passed through the curtain twice, the first time for the purpose of effecting a main coating operation and a second time for the purpose of ensuring that the coated bar is of the

specified weight.

The curtain of chocolate (or another solidifiable liquid material) produced as described with reference to either or both of the illustrated embodiments may, instead of being used to enrobe articles such as confectionery bars, be used to form a layer of controlled properties (eg thickness) into moulds as an alternative to conventional depositing technology, followed by cooling to solidify the layer. Such a technique can be used to form shells for subsequent filling with a filling material. Alternatively, the curtain may be laid onto a conveyor to form a controlled layer thereon which is subsequently solidified and cut to size to the desired shape.

CLAIMS

1. A method of applying a coating to articles, comprising the steps of:

(i) providing a curtain (30) of solidifiable liquid coating material (16);

(ii) effecting relevant movement between articles (12) to be coated and the curtain (30) so as to coat the articles with the solidifiable liquid coating material (14); and

(iii) subjecting the solidifiable liquid coating material to the action of at least one stream of gas under pressure whereby to modify the flow characteristics of the curtain.

2. A method as claimed in Claim 1, wherein the articles are articles of food and the coating material is an edible coating material.

3. A method as claimed in Claim 1 or 2, further including the steps of causing the coating material to flow along a surface of a supply means towards an outlet slot through which the coating material flows under the action of gravity to form the curtain, and introducing said at least one stream of gas between the coating material and the surface of the supply means.

4. A method as claimed in claim 3, wherein the supply means includes a trough having opposed surfaces leading towards the slot, and a layer of gas is introduced between the coating material and each of the opposed surfaces.

5. A method as claimed in claim 3 or 4, wherein said at least one stream of gas under pressure is caused to become attached to the surface

of the supply means so as to assist in establishing the layer of the gas between the surface and the coating material

6. A method as claimed in any preceding claim, wherein at least one stream of gas under pressure is applied to the coating material after the curtain has been established in order to change the direction of the curtain and/or a physical property of the coating material forming the curtain

7. A method as claimed in claim 6, wherein said at least one stream of gas is caused to flow over a curved surface adjacent to part of the curtain by virtue of the Coanda effect whereby a change in the direction of travel of the curtain is induced.

8. A method as claimed in any preceding claim, wherein more than one curtain of coating material is established to coat the articles, and the curtains are controlled simultaneously and/or independently.

9. A method as claimed in any preceding claim, wherein the pressure of the stream of gas is controlled to control the speed of descent of the curtain and the rate of relative movement between the articles and the curtain is controlled.

10. A method as claimed in any preceding claim, wherein the gas is air.

11. A method as claimed in any preceding claim, wherein the gas is at a temperature which is substantially the same as that of the solidifiable liquid coating material.

12. A method as claimed in any preceding claim, wherein the liquid

coating material is liquid chocolate.

13. An apparatus for applying a coating to articles, comprising:

(i) supply means (14) arranged to provide a curtain (30) of solidifiable liquid coating material (16);

(ii) means (10) for effecting relative movement between articles (12) to be coated and the supply means (14) whereby in use the articles (12) are coated with the solidifiable liquid coating material (16) in the curtain (30); and

(iii) means (20, 22; 40, 46, 48) arranged to subject the solidifiable liquid coating material (16) to the action of at least one stream of gas under pressure whereby to modify the flow characteristics of the curtain (30).

14. A method of controlling a curtain of a solidifiable liquid composition comprising the steps of:

(i) providing a curtain (30) of solidifiable liquid material (16); and

(ii) before, during and/or after step (i), subjecting the solidifiable liquid material (16) to the action of at least one stream of gas under pressure whereby to modify the characteristics of the curtain (30).

15. A method as claimed in claim 14, comprising the steps of depositing the modified curtain of solidifiable liquid composition to form a layer in a mould or on a surface, and solidifying the deposited composition.

16. A method as claimed in claim 14 or 15, wherein the solidifiable liquid composition is an edible composition.

17. An apparatus for controlling curtain of a solidifiable liquid

composition comprising:

(i) supply means (14) arranged to provide a curtain (30) of solidifiable liquid coating material (16); and

(ii) means (20, 22; 40, 46, 48) arranged to subject the solidifiable liquid coating material (16) to the action of at least one stream of gas under pressure whereby to modify the characteristics of the curtain (30).

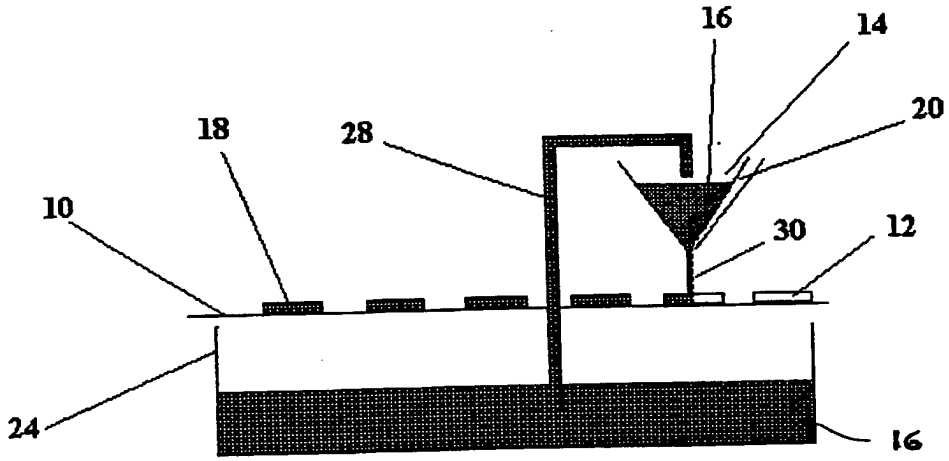
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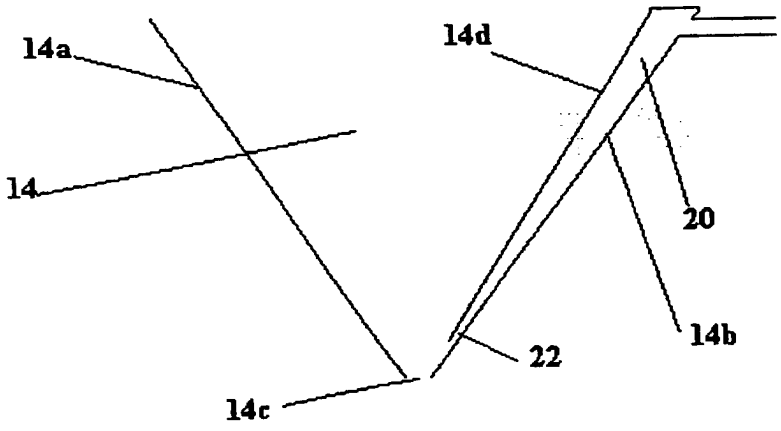
FIG. 2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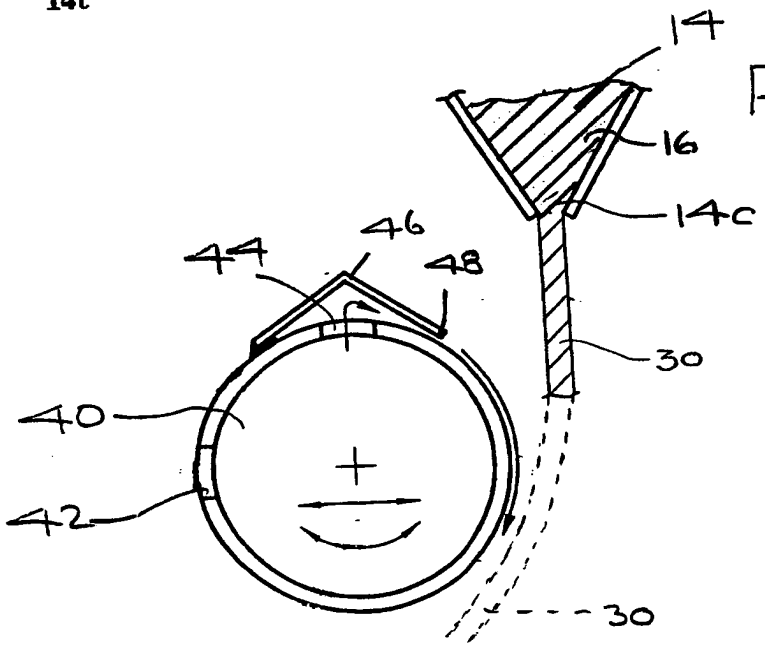
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Fig. 3

INTERNATIONAL SEARCH REPORT

In ational Application No
PCT/GB 99/00158

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A23G3/22 B05C5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A23G B05C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 128 667 A (TIMSON WILLIAM J) 5 December 1978 see the whole document	1,3-7, 9-11, 13-15,17
X	US 4 419 953 A (FOWLER DAVID P) 13 December 1983 see abstract see column 1, line 37 - column 2, line 37 see column 3, line 55 - column 4, line 18 see figures 1,3	1-11, 13-17
X	EP 0 551 237 A (EASTMAN KODAK CO) 14 July 1993 see figures 1,7 see claims	1,10,13, 17

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
4 May 1999	25/05/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Boddaert, P

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 1 559 701 A (CIBA GEIGY AG) 23 January 1980 see the whole document	1,3,5-8, 10,11, 13,17
P,A	GB 2 326 116 A (CADBURY SCHWEPPES PLC ;S & C THERMOFLUIDS LTD (GB)) 16 December 1998 see the whole document	1-17
A	US 5 004 620 A (STRAIGHT JAY G ET AL) 2 April 1991	
A	EP 0 444 767 A (ROLLS ROYCE PLC) 4 September 1991	
A	US 5 409 733 A (BENECKE JURGEN ET AL) 25 April 1995	

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int ational Application No
PCT/GB 99/00158

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4128667 A	05-12-1978	NONE	
US 4419953 A	13-12-1983	NONE	
EP 0551237 A	14-07-1993	US 5206057 A	27-04-1993
		JP 5253525 A	05-10-1993
GB 1559701 A	23-01-1980	BE 855011 A	25-11-1977
		CH 621269 A	30-01-1981
		DE 2723444 A	15-12-1977
		FR 2361164 A	10-03-1978
		JP 1297632 C	20-01-1986
		JP 53004053 A	14-01-1978
		JP 60015390 B	19-04-1985
GB 2326116 A	16-12-1998	NONE	
US 5004620 A	02-04-1991	NONE	
EP 0444767 A	04-09-1991	JP 4219161 A	10-08-1992
US 5409733 A	25-04-1995	US 5720820 A	24-02-1998
		US 5733597 A	31-03-1998
		CA 2098784 A	09-01-1994
		DE 69300548 D	02-11-1995
		DE 69300548 T	21-03-1996
		EP 0578469 A	12-01-1994
		JP 6154691 A	03-06-1994